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ABSTRACT

The Class Activities Questionnaire (CAQ) was used to compare a Canadian high school participating in a research project employing an information retrieval system with another not involved in the project. This paper evaluates the validity of the CAQ as a measurement instrument for this study. The CAQ was administered to 1831 students, 806 Science and 1025 English students, from the two high schools in Ottawa. A principal components factor analysis with a varimax rotation confirmed the earlier results of Steele, the developer of the instrument, that the cognitive and behavioral dimensions of instruction can be assessed and described using the CAQ. Although additional items are recommended to improve the measurement characteristics of the CAQ, results indicate that it is sufficiently reliable and valid for experimental use. Caution is advised against its use for routine classroom purposes. (Author/LR)

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FACTORIAL VALIDATION OF THE CLASS ACTIVITIES QUESTIONNAIRE

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ABSTRACT

The Class Activities Questionnaire (CAQ) was administered to 1,831 students, 806 Science and 1,025 English students, from 82 classrooms in two high schools in Ottawa, Canada. A principal components factor analysis with a varimax rotation confirmed the earlier results of Steele, the developer of the instrument, that the cognitive and behavioral dimensions of instruction can be assessed and described using the CAQ. Although additional items are recommended to improve the measurement characteristics of the CAQ, it is acceptable for use now with careful administrative procedures being followed.

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FACTORIAL VALIDATION OF THE CLASS ACTIVITIES QUESTIONNAIRE[1]

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Developmental activities in constructing many measurement instruments are often minimal resulting in reduced confidence in the obtained score(s) due to limited resources being available or a decision to invest minimal resources because the product will be used once or at most a few times. New instruments are often developed to evaluate an instructional program, to assess treatment effects in an experiment, or to obtain descriptive data for a particular setting. Wardrop and Williams state that

> While the development of appropriate outcome measures should therefore be encouraged, an investigator's decision to use such measures carries with it some important obligations. Some of these obligations are obvious: reproducibility, of the measuring procedure, reliability of the scores derived, validity of these scores. Reproducibility is clearly necessary, both for practical and ethical reasons. Reliability and validity also are widely accepted as being essential for any measuring instrument (p. 1, 1970).

The concern here is primarily with one aspect of the validity of the Class Activities Questionnaire[2] (CAQ) developed and subsequently modified by Steele (1969a, 1969b). The CAQ was developed to

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[1]Paper presented at the Annual Meeting of the American Educational Research Association, New York, February 1971.

[2]A copy of the CAQ may be obtained by writing to Illinois Gifted Program Evaluation, 805 West Pennsylvania Avenue, Urbana, Illinois 61801.

> . . . obtain information concerning cognitive, behavioral, and affective activities the teacher intended and students perceived actually occurring in the classroom or special program (p. 1, 1969b).

Background and Aims of the Study

Since 1968 a project in Ottawa, Canada, has had an information retrieval system, using television monitors and a coaxial cable network, operational in four schools. Although considerable data have been gathered using instruments developed especially for the project and using materials in modified form from other research projects, it seemed desirable to investigate further the cognitive domain from a general viewpoint independent of specific content such as a text, class period, or unit of work. The main interests were (a) to describe the "environment" of the one high school in the project as well as that of a comparable high school not using the information retrieval system, and (b) to examine the differences between the two high schools as observed from the obtained scores. Thus, an appropriate measurement instrument was required which led to the selection of the CAQ. In addition to requiring less than a class period of time for administration, the three sections of the CAQ assessing (a) cognitive emphasis, (b) classroom condition, and (c) strengths and weaknesses of the class perceived by the students were attractive for use in the project. However, prior to basing conclusions upon the obtained scores, it is necessary to further evaluate the CAQ, from a validity point of view, in that it was used previously in a special setting, namely the Illinois Gifted Program Evaluation, which may have implications for drawing conclusions for other samples. Therefore, the emphasis in this paper is upon evaluating the CAQ as a measurement instrument with conclusions

and implications for the project awaiting the results of this paper.

Method

The CAQ was administered in June, 1970 to 1,831 students in two high schools from 82 classrooms as shown in Table 1.

TABLE 1

DESCRIPTIVE SAMPLE DATA

Subject	Grade	School		Total
		Comparison	Experimental	
English	9	296	214	
	11	247	268	
		(543)	(482)	1,025
Science	10	262	199	
	12	174	171	
		(436)	(370)	806
TOTAL		979	852	1,831

Standard instructions were written for supply teachers to administer the CAQ. All classroom teachers and students completed the forms during regular English or Science periods over a period of two days.

Results

Factor analysis results of the CAQ data for total sample, English, and Science students, with their respective matrices of varying cell entries obtained by applying routines using missing data calculations

on student responses, are presented in Tables 2 to 7. A conventional approach is for students to represent the sampling domain and to delete those with incomplete data. In analyzing the CAQ data, two parallel analyses were obtained on students using missing data procedures and then to consider the classroom as the unit under consideration. Blank categories were assigned values of 2.5 for items 1 to 25, 3.071 for item 26, and 3.177 for item 27. The value of 2.5 is merely a mid-position neutral response whereas values for items 26 and 27 are respectively means for 1812 and 1804 responses from the 1831 students in this study. A second analysis of the data is presented in Tables 8, 9, and 10 where the unit of concern is the class.

On only the second item--a central activity is to make judgments of good/bad, right/wrong, and explain why--did missing data exceed 2 percent but less than 4 percent. Thus, missing data procedures required minimal adjustment of the data for later analyses.

Results from a factor analysis of the total sample of students are presented in Table 2 and again in Table 11 to illustrate the relationship between the statistical and logical factors of the CAQ proposed by Steele et al.(1971) as shown in Table 12 for comparison purposes. As well, pairs of items related to each logical factor are more clearly delineated. When considering pairs of items, all ten pairs of items were each found within the same factor for the total student sample on seven orthogonal factors. In looking at the various analyses the number of pairs of items failed to load on a single factor as follows: (a) total students-0, (b) total classes-2, (c) English students-1, (d) English classes-1, (e) science students-2, and (f) science classes-2.

TABLE 2

PRINCIPAL COMPONENTS FACTOR ANALYSIS OF THE CAQ:
ENGLISH AND SCIENCE STUDENTS

Item	I	II	III	IV	V	VI	VII	VIII
1.	.06	.25	.04	.01	.40	-.14	.04	.01
2.	.12	-.16	-.04	.04	.58	-.02	.04	-.10
3.	.07	.01	.09	-.08	.01	-.01	.11	.28
4.	.69	.03	-.17	.12	.04	.01	.01	.09
5.	.01	.12	-.01	-.45	-.03	.06	-.13	.11
6.	.11	.00	.05	.02	-.05	.51	.04	.01
7.	.05	-.02	.12	-.01	.03	.06	.61	-.04
8.	.12	.29	.11	.14	.24	-.13	-.04	.13
9.	-.15	-.06	-.13	-.08	.46	.04	.02	-.07
10.	.02	.46	.21	.06	.07	-.04	-.18	.13
11.	.02	-.06	-.07	.10	-.02	.12	.17	.34
12.	-.03	.05	-.01	.03	.02	-.04	.59	.13
13.	-.07	.06	-.21	.03	.03	-.16	.14	.47
14.	-.01	.00	-.03	-.06	-.05	.02	-.06	.44
15.	.07	.06	.16	.45	.04	-.07	-.13	.08
16.	.03	.09	.06	.07	.04	.61	-.12	-.02
17.	-.13	-.06	-.17	-.02	.04	.39	.11	.11
18.	.03	-.45	.15	.00	.11	.01	-.07	.17
19.	.09	.01	.15	-.39	.02	-.11	-.11	.19
20.	-.07	-.12	.08	.02	.34	.19	-.21	.15
21.	-.18	.16	.14	-.14	.24	.15	.11	-.04
22.	-.05	.55	-.09	-.06	-.09	.13	.08	-.04
23.	-.03	-.05	.10	-.04	-.03	.08	-.15	.42
24.	.01	.08	-.07	.44	-.05	.11	-.05	.01
25.	-.16	-.10	.50	.30	-.09	-.04	.06	.08
26.	-.59	.05	-.12	.15	.05	-.07	-.04	.08
27.	-.04	-.01	-.64	.17	.00	-.04	-.10	.08
Eigenvalues	4.08	2.15	1.44	1.26	1.24	1.17	1.10	1.03

TABLE 3

MATRIX OF SAMPLE SIZES: ENGLISH AND SCIENCE

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	1823																						
2	1758	1762																					
3	1797	1737	1802																				
4	1808	1749	1787	1816																			
5	1812	1751	1792	1805	1820																		
6	1812	1753	1791	1804	1808	1819																	
7	1803	1746	1783	1796	1799	1799	1810																
8	1815	1755	1795	1808	1812	1811	1803	1823															
9	1800	1744	1780	1791	1797	1796	1786	1800	1806														
10	1809	1750	1788	1802	1806	1805	1797	1809	1792	1817													
11	1796	1737	1777	1790	1794	1792	1785	1797	1784	1790	1804												
12	1799	1747	1779	1792	1794	1794	1786	1798	1783	1791	1780	1805											
13	1793	1738	1776	1784	1788	1788	1780	1792	1781	1786	1775	1779	1799										
14	1816	1755	1794	1807	1811	1811	1802	1815	1800	1808	1796	1799	1792	1822									
15	1813	1754	1792	1806	1811	1811	1801	1814	1798	1807	1795	1798	1791	1813	1821								
16	1799	1744	1779	1791	1797	1794	1787	1798	1783	1793	1781	1783	1777	1799	1797	1806							
17	1809	1749	1788	1802	1806	1804	1796	1810	1796	1802	1791	1791	1786	1809	1807	1792	1816						
18	1801	1742	1780	1794	1798	1797	1789	1802	1788	1796	1784	1784	1779	1800	1800	1785	1795	1809					
19	1813	1754	1793	1806	1811	1809	1801	1813	1797	1807	1794	1796	1790	1812	1811	1798	1806	1799	1821				
20	1798	1746	1779	1789	1794	1794	1786	1797	1783	1791	1780	1785	1779	1797	1797	1784	1790	1784	1795	1804			
21	1809	1751	1791	1802	1806	1806	1799	1809	1794	1803	1790	1793	1791	1808	1807	1793	1802	1795	1809	1793	1817		
22	1803	1745	1782	1797	1800	1799	1790	1803	1787	1797	1785	1787	1780	1802	1802	1788	1797	1791	1802	1790	1798	1811	
23	1802	1746	1783	1795	1801	1798	1791	1803	1788	1796	1785	1788	1782	1802	1804	1787	1797	1788	1802	1787	1797	1791	1810
24	1804	1750	1783	1797	1802	1800	1792	1805	1790	1798	1788	1788	1782	1804	1803	1791	1799	1792	1804	1788	1799	1794	1794
25	1814	1754	1793	1807	1813	1810	1801	1814	1799	1808	1797	1796	1791	1813	1812	1800	1807	1801	1815	1796	1809	1803	1803
26	1804	1746	1783	1799	1801	1800	1793	1804	1788	1798	1785	1787	1781	1803	1802	1790	1797	1790	1803	1788	1799	1794	1792
27	1796	1738	1777	1789	1794	1792	1784	1796	1783	1790	1779	1779	1774	1795	1795	1783	1790	1784	1795	1781	1791	1787	1784

TABLE 3--Continued

24	25	26	27

TABLE 4

PRINCIPAL COMPONENTS FACTOR ANALYSIS OF THE CAQ:
ENGLISH STUDENTS

Item	I	II	III	IV	V	VI	VII
1.	.01	-.03	-.01	-.10	.08	.04	.49
2.	-.18	.11	.04	.11	-.24	-.11	.49
3.	-.13	.13	-.08	.04	.03	.29	.01
4.	-.64	-.27	.11	.02	.03	.09	.15
5.	-.07	.09	-.43	.02	.11	.05	.00
6.	-.16	.01	.05	.52	-.03	-.02	-.09
7.	-.03	.05	.08	.28	-.03	.21	.00
8.	-.03	.03	.12	-.11	.14	.12	.36
9.	.18	-.08	-.13	.05	-.11	-.09	.43
10.	.07	.24	.06	-.09	.37	.07	.20
11.	.03	-.07	.04	.04	-.10	.38	.04
12.	.09	-.11	.04	.17	.11	.36	-.01
13.	.02	-.10	.00	-.08	.08	.47	.06
14.	-.08	.07	-.03	-.07	-.08	.42	-.05
15.	-.13	.14	.42	-.05	.07	.00	.07
16.	.05	.05	.01	.54	.10	-.14	.02
17.	.09	-.12	-.07	.37	-.03	.10	-.02
18.	-.01	.09	-.03	.01	-.52	.10	.00
19.	-.08	.17	-.39	-.09	-.02	.11	.00
20.	.02	.09	.03	.19	-.27	.05	.20
21.	.36	-.03	-.09	.23	.10	-.01	.22
22.	-.04	.05	-.03	.14	.57	.02	.00
23.	.07	.13	-.11	.02	-.04	.28	-.04
24.	-.05	.01	.45	.04	.06	.02	-.03
25.	.16	.41	.39	.00	-.11	.09	-.11
26.	.50	-.18	.17	-.10	-.03	.09	.06
27.	.05	-.70	.10	.00	-.02	.04	-.04
Eigenvalues	4.40	2.22	1.45	1.28	1.21	1.20	1.04

TABLE 5

MATRIX OF SAMPLE SIZES: ENGLISH STUDENTS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	1020																						
2	980	982																					
3	1003	966	1006																				
4	1008	971	994	1013																			
5	1016	978	1003	1009	1021																		
6	1013	976	999	1006	1014	1018																	
7	1007	973	994	999	1007	1005	1011																
8	1015	978	1002	1008	1016	1013	1007	1020															
9	1001	967	987	993	1002	999	992	1002	1005														
10	1014	977	1000	1007	1015	1012	1006	1014	999	1019													
11	1004	967	991	998	1006	1002	997	1005	993	1003	1009												
12	1001	970	988	995	1001	998	993	1001	986	999	991	1005											
13	1001	967	990	993	1001	998	993	1001	989	1000	992	988	1005										
14	1018	980	1003	1010	1018	1015	1009	1018	1004	1016	1007	1003	1003	1022									
15	1015	978	1001	1008	1016	1014	1007	1016	1001	1014	1005	1002	1001	1018	1020								
16	1006	973	993	998	1007	1003	998	1005	992	1005	994	992	992	1007	1005	1010							
17	1013	976	999	1005	1013	1010	1004	1014	1002	1011	1002	998	999	1016	1013	1002	1017						
18	1005	968	991	998	1006	1003	997	1006	994	1005	995	991	991	1007	1006	995	1003	1010					
19	1017	981	1004	1010	1018	1015	1008	1017	1003	1016	1006	1003	1003	1019	1017	1008	1014	1007	1022				
20	1005	972	992	997	1006	1003	998	1005	991	1004	995	992	993	1007	1006	998	1002	995	1007	1009			
21	1010	974	998	1003	1011	1009	1003	1010	996	1009	999	996	999	1012	1010	1001	1007	1000	1013	1001	1015		
22	1011	974	997	1004	1012	1009	1002	1011	997	1010	1000	998	997	1013	1012	1002	1008	1002	1014	1004	1007	1016	
23	1007	973	994	1000	1008	1005	1000	1008	994	1006	997	995	994	1010	1009	998	1005	997	1010	999	1003	1004	1012
24	1008	975	994	1001	1009	1006	1000	1009	996	1007	998	995	995	1011	1009	1000	1007	998	1011	999	1004	1005	1002
25	1014	977	1000	1007	1016	1012	1005	1014	1001	1013	1004	999	1000	1016	1014	1005	1011	1004	1017	1004	1010	1011	1007
26	1007	971	993	1001	1008	1005	999	1007	993	1006	996	993	993	1009	1007	1000	1004	997	1010	998	1003	1005	1000
27	1005	970	992	998	1006	1003	997	1005	994	1004	995	991	992	1007	1005	998	1002	997	1008	996	1001	1003	998

TABLE 5--Continued

24	25	26	27

10
11

1013
1008 1019

1001 1007 1012
1000 1005 1001 1010

TABLE 6

PRINCIPAL COMPONENTS FACTOR ANALYSIS OF THE CAQ: SCIENCE STUDENTS

Item	I	II	III	IV	V	VI	VII
1.	-.06	.14	.02	.07	.43	-.04	.00
2.	-.22	.52	-.16	.19	.09	.05	-.14
3.	.08	-.02	-.01	.05	.05	.25	.14
4.	.10	.01	-.65	-.07	.05	.03	-.02
5.	.04	-.02	.01	-.08	.05	-.05	.51
6.	.48	-.09	-.03	.00	-.01	-.02	.03
7.	.20	.04	.04	.47	-.04	-.14	.07
8.	-.09	-.05	-.11	.09	.48	.06	-.06
9.	.02	.47	.13	.05	.04	.02	.03
10.	.06	-.10	.01	-.23	.46	-.02	.00
11.	.31	.02	-.06	.13	-.05	.17	-.04
12.	.09	.12	.03	.48	.03	.03	-.04
13.	.13	.27	.15	-.23	-.04	.25	.10
14.	.26	.04	.11	-.17	.01	.15	.28
15.	-.01	-.06	.05	-.17	.10	.18	-.42
16.	.45	-.04	-.15	.10	.11	-.01	-.15
17.	.35	.21	.11	.09	-.12	.05	-.03
18.	-.07	.03	-.06	.03	-.19	.42	-.07
19.	-.13	-.05	-.10	.00	.09	.21	.39
20.	-.02	.22	.00	-.05	.22	.37	-.12
21.	.02	.02	.06	.20	.28	.09	.12
22.	.21	.01	.10	-.13	.34	-.29	.08
23.	.13	-.07	.01	-.11	.02	.43	.08
24.	.21	.01	-.02	-.15	.04	-.14	-.36
25.	-.04	-.42	.20	.17	.07	.30	-.22
26.	-.01	.04	.62	.00	.05	-.03	-.07
27.	.07	.30	-.02	-.40	-.09	-.09	-.11
Eigenvalues	3.83	2.17	1.64	1.40	1.26	1.15	1.05

TABLE 7

MATRIX OF SAMPLE SIZES: SCIENCE STUDENTS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	803																										
2	778	780																									
3	794	771	796																								
4	800	778	793	803																							
5	796	773	789	796	799																						
6	799	777	792	798	794	801																					
7	796	773	789	797	792	794	799																				
8	800	777	793	800	796	798	796	803																			
9	799	777	793	798	795	797	794	798	801																		
10	795	773	788	795	791	793	791	795	793	798																	
11	792	770	786	792	788	790	788	792	791	787	795																
12	798	777	791	797	793	796	793	797	797	792	789	800															
13	792	771	786	791	787	790	787	791	792	786	783	791	794														
14	798	775	791	797	793	796	793	797	796	792	789	796	789	800													
15	798	776	791	798	795	797	794	798	797	793	790	796	790	795	801												
16	793	771	786	793	790	791	789	793	791	788	787	791	785	792	796												
17	796	773	789	797	793	794	792	796	794	791	789	793	787	793	794	790	786	789	789	788	786	791	795				
18	796	774	789	796	792	794	792	796	794	791	789	793	788	793	795	789	792	791	792	788	794	787	798				
19	796	773	789	796	793	794	793	796	794	791	788	793	787	793	795	789	792	794	793	789	795	789	792	799			
20	793	774	787	792	788	791	788	792	792	787	785	793	786	790	796	795	796	797	798	792	799	792	796	798	803		
21	799	777	793	799	795	797	796	799	798	794	791	797	792	796	794	790	786	791	793	790	796	792	794	797	800		
22	792	771	785	793	788	790	788	792	790	787	785	789	783	789	795	790	785	788	787	785	790	784	786	787	791	788	794
23	795	773	789	795	793	793	791	795	794	790	788	793	788	792	795	793	790	793	793	790	796	789	792	794	797	800	
24	796	775	789	796	793	794	792	796	794	791	790	793	787	793	795	793	791	794	793	791	794	791	793	795	798	801	
25	800	777	793	800	797	798	796	800	798	795	793	797	791	797	797	795	793	795	795	793	797	793	795	797	800	803	
26	797	775	790	798	793	795	794	797	795	792	789	794	788	794	794	792	788	792	792	788	794	788	792	794	797	800	
27	791	768	785	791	788	789	787	791	789	786	784	788	782	788	790	788	784	787	787	784	790	784	787	791	788	794	

TABLE 8

PRINCIPAL COMPONENTS FACTOR ANALYSIS OF THE CAQ:
ENGLISH AND SCIENCE CLASSES (N=82)

Item	I	II	III	IV	V	VI	VII	VIII
1.	.10	.09	.05	.41	.17	.22	-.01	-.09
2.	-.26	.04	.62	-.01	.06	-.10	-.01	-.10
3.	.03	.37	.02	-.12	-.13	.10	-.10	-.01
4.	.15	.07	-.02	.03	-.63	.06	.14	-.07
5.	.10	.06	-.13	.08	.07	-.17	-.47	.08
6.	-.09	-.15	-.03	-.01	-.09	.01	-.05	.45
7.	-.22	-.06	.11	-.01	-.06	.47	-.05	.00
8.	.02	.28	-.23	.18	.05	-.09	.19	-.13
9.	.22	.18	.55	.00	-.06	.11	.12	-.02
10.	.02	-.07	-.10	.47	-.09	-.04	-.02	.02
11.	.14	.08	-.12	-.08	-.05	.35	.03	.32
12.	.02	-.03	-.08	-.04	-.01	.57	.04	-.07
13.	.10	.51	.03	.11	.07	-.01	-.02	-.04
14.	-.03	.45	.13	-.03	-.05	-.03	-.05	.01
15.	.00	.01	-.08	.10	-.01	-.06	.35	-.07
16.	-.13	.06	.02	-.08	-.02	-.20	.18	.46
17.	.14	.10	-.01	.08	.10	.13	.00	.43
18.	.01	-.02	-.01	-.36	.08	.09	-.15	.07
19.	-.09	.09	-.09	.01	.00	-.02	-.47	-.13
20.	.11	-.07	.33	.01	.07	-.12	-.05	.32
21.	.02	.04	.02	.30	.20	.29	-.07	.18
22.	-.29	-.02	.08	.47	-.01	-.06	.02	.08
23.	-.18	.38	-.16	-.03	-.01	-.11	-.05	.23
24.	.13	-.11	-.02	.12	-.04	-.10	.34	.11
25.	-.35	.22	-.15	-.22	.25	.07	.39	-.03
26.	.17	-.05	.00	-.05	.62	.00	.07	-.08
27.	.65	.04	.00	-.07	.04	-.08	.07	.00
Eigenvalues	6.33	2.95	2.69	2.35	1.78	1.60	1.27	1.07

TABLE 9

PRINCIPAL COMPONENTS FACTOR ANALYSIS OF THE CAQ:
ENGLISH CLASSES (N=45)

Item	I	II	III	IV	V	VI	VII
1.	-.01	-.24	.30	.00	.32	.11	.22
2.	-.01	.07	.52	.01	-.01	-.08	.00
3.	.08	-.03	-.01	-.15	-.12	.37	-.07
4.	.21	-.07	.08	.13	-.44	.11	.21
5.	.00	-.02	-.09	-.49	.02	.03	.03
6.	-.01	.53	-.09	.01	.00	-.06	-.02
7.	-.40	.02	.20	.03	-.07	.15	-.18
8.	.08	-.21	-.16	.09	.10	.22	.22
9.	-.02	-.11	.60	.08	.00	.04	-.02
10.	.05	.08	.00	-.08	.00	-.04	.53
11.	-.02	-.07	.10	-.11	.15	.23	-.19
12.	-.08	.11	-.06	.30	-.06	.42	-.06
13.	.09	.03	-.14	.04	.07	.46	.07
14.	-.03	.01	.13	-.03	-.08	.38	-.02
15.	.02	-.11	-.10	.23	-.06	.00	.22
16.	-.15	.45	-.06	.04	-.05	.06	.04
17.	.17	.40	.07	-.12	.16	.18	.24
18.	.11	.15	-.04	-.07	.01	.05	-.33
19.	.00	-.04	-.09	-.51	-.01	.06	.02
20.	.10	.36	.19	.09	.07	-.05	-.17
21.	.03	.14	.10	.01	.48	.04	.18
22.	-.35	.11	.04	.05	.02	.03	.34
23.	-.17	-.04	-.03	-.13	.07	.31	.01
24.	.11	.02	-.07	.31	.01	-.07	.17
25.	-.38	-.09	-.24	.33	.19	.04	-.16
26.	.12	-.08	-.10	.04	.57	-.07	-.11
27.	.61	-.01	.03	.19	.05	.12	.17
Eigenvalues	7.60	3.30	2.80	2.06	1.60	1.52	1.14

TABLE 10

PRINCIPAL COMPONENTS FACTOR ANALYSIS OF THE CAQ:
SCIENCE CLASSES (N=37)

Item	I	II	III	IV	V	VI	VII
1.	.13	-.07	-.23	.21	.13	.29	.33
2.	.10	.06	.28	.16	-.56	-.19	.23
3.	.06	.08	.41	-.12	-.05	-.03	-.11
4.	-.05	.00	.08	-.60	.06	-.02	.02
5.	.33	-.23	.02	-.01	.22	.04	-.02
6.	-.02	.44	.05	-.17	.00	.03	-.03
7.	-.07	.00	-.02	-.01	-.41	.25	-.09
8.	.04	.07	-.15	.07	.05	-.05	.33
9.	-.20	-.16	.60	.00	.14	.09	-.13
10.	-.09	-.02	-.02	-.07	.16	-.03	.26
11.	-.08	.07	-.01	-.16	-.03	.42	-.08
12.	-.12	-.17	-.04	.08	-.22	.37	-.21
13.	.17	.09	.40	.17	.10	-.02	.15
14.	.36	.22	.16	.14	.14	.01	.06
15.	-.32	.08	-.05	.14	.02	-.05	.10
16.	-.13	.44	.04	-.08	-.05	.12	.10
17.	.01	.11	.04	.14	.17	.46	-.04
18.	.13	.08	.01	.08	-.05	.02	-.35
19.	.41	-.14	-.03	-.02	-.13	-.10	-.03
20.	.04	-.02	.24	.01	-.12	.23	.37
21.	.15	.00	.03	.00	-.10	.38	.14
22.	-.11	.01	.01	-.03	-.12	-.04	.41
23.	.33	.17	-.05	-.14	.10	.19	-.02
24.	-.37	.03	.02	-.08	.10	.05	.16
25.	-.01	.57	-.09	.28	.02	-.10	-.19
26.	-.19	-.15	.09	.52	.06	.01	-.11
27.	-.06	.00	.16	.06	.46	.00	.06
Eigenvalues	6.79	4.23	3.45	2.10	1.40	1.37	1.13

TABLE 11

RELATIONSHIP OF THE STATISTICAL AND LOGICAL FACTORS OF THE CAQ

Factor Analysis	Logical Factors and Paired Items (Factor loadings and key words in item)
	COGNITIVE ITEMS
	1. Memory
Factor V	1. (.40) Remember and recognize
Factor II	1. (.25) Remember and recognize
	10. (.46) Memorize
Factor III	10. (.21) Memorize
	2. Translation
Factor V	9. (.46) Restate ideas
	21. (.24) Explain and summarize
	3. Interpretation
Factor VI	6. (.51) See implications
	16. (.61) Find trends and consequences
	4. Application
Factor VIII	3. (.28) Put methods and ideas to use
	13. (.47) Practice methods to solve problems
Factor III	13. (-.21) Practice methods to solve problems
	5. Analysis
Factor VII	7. (.61) Logical reasoning and analysis
	12. (.59) Think through complicated problems
	6. Synthesis
Factor VIII	11. (.34) Produce something new
	23. (.42) Invent, design, compose, create
	7. Evaluation
Factor V	2. (.58) Make judgments and explain why
	20. (.34) Judge the value of ideas
Factor VII	20. (-.21) Judge the value of ideas
	AFFECTIVE ITEMS: CLASSROOM FOCUS
	8. Discussion
Factor IV	5. (-.45) Actively participate
	15. (.45) Opportunity to participate
	9. Test/Grade Stress
Factor V	8. (.24) Know the one best answer
	8. (.29) Know the one best answer
Factor II	22. (.55) Great concern for grades

TABLE 11--Continued

		10. Lecture
Factor I		4. (.69) Do other things than listen in class
		26. (-.59) Amount of teacher talk
		AFFECTIVE ITEMS: CLASSROOM CLIMATE
		11. Enthusiasm
Factor IV		19. (-.39) Excitement and involvement
		12. Independence
Factor VIII		14. (.44) Independently explore and begin new activities
		13. Divergence
Factor VI		17. (.39) Discover many solutions
		14. Humor
Factor III		25. (.50) Jokes or laughter in class
Factor IV		25. (.30) Jokes or laughter in class
		AFFECTIVE ITEMS: CLASSROOM ACTIVITY
		15. Teacher Talk
Factor I		26. (-.59) Amount of teacher talk
		16. Homework
Factor III		27. (-.64) Class preparation

Note: Item 18, which did not load on any factor, and item 24, loading .44 on Factor IV, were dropped in the final stages of field testing by Steele et al. (1970) but were not deleted from the form of the instrument used in data collection.

TABLE 12

RELATIONSHIP OF THE STATISTICAL COMPONENTS AND LOGICAL FACTORS OF THE CAQ

Statistical Components	Logical Factors and Paired Items (Factor loadings and key words in item shown)
	COGNITIVE FACTORS (1-7)
	1. Memory
Component 2	1. (.53) Remember and recognize
Component 2	10. (.73) Memorize
	2. Translation
Component 7	9. (-.80) Restate ideas
Component 7	21. (-.45) Explain and summarize
Component 5	21. (.43) Explain and summarize
	3. Interpretation
Component 3	6. (-.71) See implications
Component 3	16. (-.80) Find trends and consequences
	4. Application
Component 1	3. (.56) Put methods and ideas to use
Component 1	13. (.45) Practice methods to solve problems
	5. Analysis
Component 5	7. (.73) Logical reasoning and analysis
Component 5	12. (.72) Think through complicated problems
	6. Synthesis
Component 1	11. (.64) Produce something new
Component 1	23. (.71) Invent, design, compose, create
	7. Evaluation
Component 9	2. (.83) Make judgments and explain why
Component 10	20. (.69) Judge the value of ideas
	AFFECTIVE FACTORS (8-16)
	8. Discussion
Component 4	5. (-.78) Actively participate
Component 4	15. (.69) Little opportunity to participate (Item reversed)
	9. Test/Grade Stress
Component 2	8. (.64) Know the one best answer
Component 2	22. (.6[illegible]eat concern for grades
	10. Lecture
Component 8	4. (.93) Do other things than listen in class
	26. (Not incl. in Factor Analysis) Teacher Talk
	11. Enthusiasm
Component 4	19. (-.65) Excitement and involvement
	19. (.43) Excitement and involvement
	12. Independence
Component 1	14. (.57) Independently explore and begin new activities
	13. Divergence
	17. Discover many solutions
	14. Humor
Component 6	25. (.96) Jokes or laughter in class
	15. Teacher Talk
	26. (not included in analysis)
	16. Homework
	27. (not included in analysis)

(Items 18 and 24 were dropped in final stages of field testing, but not deleted from the form of the instrument used in data collection.)

The unit for analysis most appropriate appears to be the class although the student data seems to have a more concise structure. Further analytical procedures are required to match the two sets of matrices along lines suggested by Meredith (1964a, 1964b), Evans (1970) and current work being done by Joreskog at Educational Testing Service. Although these procedures are indeed desirable, for present purposes it is sufficient to note that the pairs of items appear relatively stable in the CAQ, but more items are required to achieve the set of logical factors postulated. The items used in the instrument essentially maintain the same factor structure from one sample to another.

Reliability coefficients were calculated (Horst, 1949) for pairs of items and larger groupings as illustrated in Table 13 with the data for the Illinois Gifted Program Evaluation from Steele et al. (1970) shown for comparison purposes. For present purposes coefficients of .14 and .28 lead to the decision that a particular subscore is unreliable and not worth using for interpretation purposes. However, reference to Table 14 indicates how little some sections of the CAQ would need to be expanded to achieve acceptable reliability coefficients. Entries for Table 14 were calculated using the general Spearman-Brown formula

$$R_{kk} = \frac{k\, r_{11}}{1 + (k - 1)\, r_{11}}$$

where r_{11} is the reliability of the unit test, k is the number of items in the lengthened test divided by the number of items in the unit test, and R_{kk} is the reliability of the lengthened test.

Each classroom was used as the unit for analysis in calculating reliability coefficients (Wahlstrom, 1970) in contrast to traditional procedures of using individual responses.

TABLE 13

RELIABILITY COEFFICIENTS FOR THE CAQ

CAQ FACTORS	GIFTED CLASSROOMS[1]	SCIENCE[2]	ENGLISH[3]	SCIENCE AND ENGLISH[4]
Lower Thought Processes				
1. Memory	.88	.56	.59	.60
2. Translation	.65	.25	.31	.28
3. Interpretation	.86	.66	.45	.68
Higher Thought Processes				
4. Application	.83	.50	.54	.52
5. Analysis	.78	.78	.21	.73
6. Synthesis	.89	.68	.56	.64
7. Evaluation	.71	.14	.26	.30
Classroom Focus				
8. Discussion	.58	.71	.74	.74
9. Test/grade stress	.89	.50	.57	.54
10. Lecture	.82	.57	.48	.52
Classroom Climate - Affective Behavior				
11. Enthusiasm	.91	.85	.80	.83
12. Independence	.85	.57	.36	.47
13. Divergence	.70	.58	.37	.50
14. Humor	.86	.80	.75	.77
Classroom Climate - Time on Activities				
15. Teacher talk	.94	.83	.68	.76
16. Weekly preparation time	.87	.73	.73	.73
CAQ DIMENSIONS				
Lower Thought Processes	.76	.52	.35	.45
Higher Thought Processes	.85	.63	.47	.55
Classroom Focus	.88	.71	.66	.68
Classroom Climate (11-14)	.86	.73	.63	.68
Classroom Climate (15-16)		.78	.71	.75
Classroom Climate (11-16)		.76	.68	.72

1. N = 131 classes; 3138 students
2. N = 37 classes; 806 students
3. N = 45 classes; 1025 students
4. N = 82 classes; 1831 students

TABLE 14

RELIABILITY COEFFICIENTS ESTIMATED FOR
INCREASED ITEMS IN THE CAQ

r_{11} \ k	2	3	5	10	15	20	25
.14	.25	.33	.45	.62	.71	.77	.80
.28	.44	.54	.66	.80	.85	.89	.91
.45	.62	.71	.80	.89	.92	.94	.95
.60	.75	.82	.88	.94	.96	.97	.97
.78	.88	.91	.95	.97	.98	.99	.99

In general, reliability coefficients obtained in this study are lower than those reported by Steele et al. (1970). Within the Illinois Gifted Program there is a relatively homogeneous treatment within classes but heterogeneous between classes as single classes are found in several schools throughout the state with considerable latitude as to the program in each school. In the present study treatments are relatively homogeneous between and within classes with 39 teachers for the 82 classes. In calculating the reliability coefficients the formula $r = 1 - \frac{MS_w}{MS_b}$ was used. One could conceive of classes in this study being very similar yielding a MS_b that would approach the MS_w resulting in low reliability estimates when using the class as a unit for analysis. Thus, although some of the reliabilities are low for this type of instrument, they are in general sufficiently high to warrent drawing conclusions from the data. However, as noted earlier, inclusion of additional items would strengthen the psychometric properties of the CAQ.

Conclusion

The CAQ shows considerable promise as an instrument to identify characteristics of the cognitive and affective domains but further development is required to optimally separate each level. More items are desirable since the sixteen logical factors would be extremely difficult to measure with only 27 items. Measurement error is a reality! Alternatively, the CAQ could be used as a broad-scope instrument with other more detailed sets of items designed to assess each scale of the CAQ as desired. Thus, factorially the CAQ, at this stage of development, looks sufficiently promising to derive results for further analyses between samples. Further

details and evaluation of the CAQ are presented by House et al. (1971) in a paper entitled Patterns of Cognitive and Affective Emphasis in Gifted and Average Classes.

In summary, the CAQ appears to be sufficiently reliable and valid to be used for experimental purposes with a word of caution regarding routine use in classrooms. Potential users should be aware that many students and teachers find the CAQ threatening and do not wish to participate by completing the form. As well, difficulty is often encountered when names are requested to enable one to later identify the individual responses for further analyses with related data.

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